

Orbiter 101 Undergoes Critical Design Review

The critical design review (CDR) for the first Space Shuttle Orbiter, now in final assembly at Palmdale, Calif., was held at Rockwell International Space Division's Downey plant in late October, and the CDR board called the spacecraft's progress "excellent." Engineers from the JSC Space Shuttle Orbiter Project Office spent two weeks at the RI facility reviewing manufacturing, quality control, engineering and flight test data and procedures as a step toward Orbiter 101's systems checkout next spring.

NSA Begins CPS Review

The NASA Clear Lake Chapter of the National Secretaries Association (International) has announced that Steve Goldenberg, P.E., will instruct the Data Processing section of the CPS Review Course on November 10 and 17.

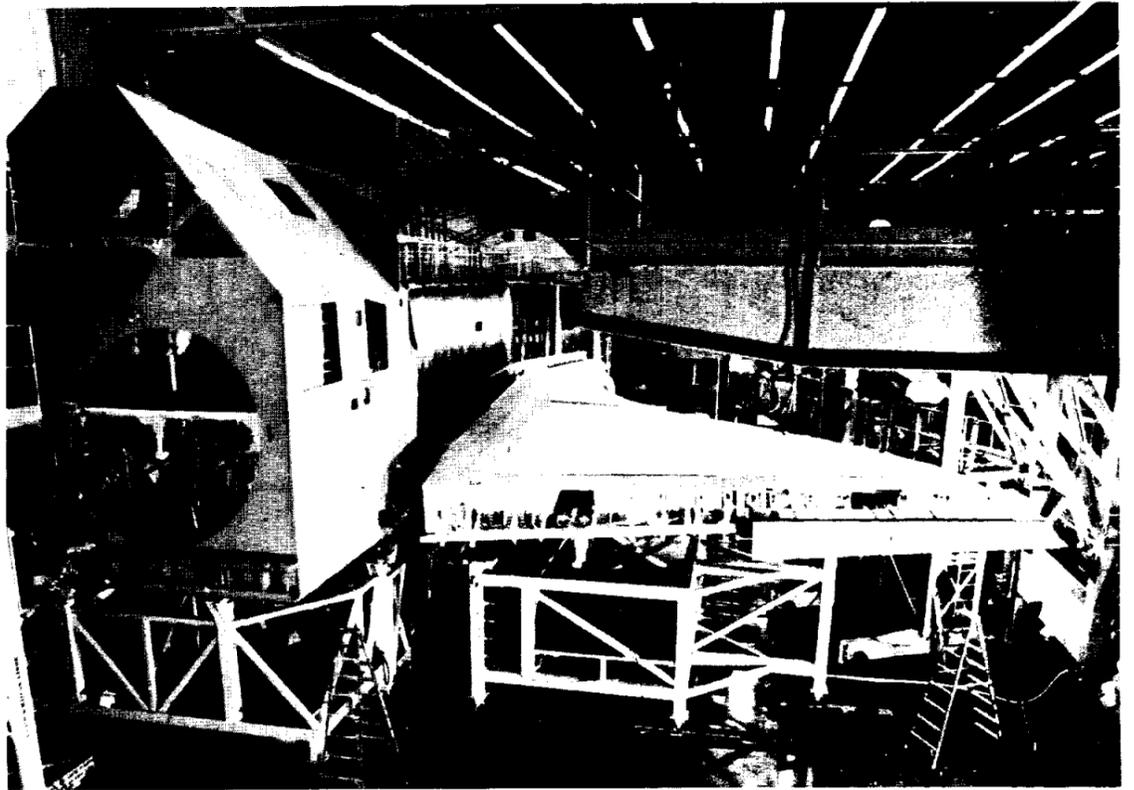
The CPS Review Course, held each Monday evening 6:30 to 8:30 at the Webster State Bank is a course of study designed to assist any secretary in enhancing her professional standing and in preparation for the Certified Professional Secretary examination administered each May by the Institute for Certifying Secretaries.

Registrations are still being accepted for the first semester of study. For further information, call Lee Carr, 488-3173, or Virginia Thomas, CPS, 474-4191.

Orbiter Project Manager Aaron Cohen, CDR Chairman, said that "there are no major issue in the development of the first Shuttle Orbiter, and it is obvious that NASA and contractor people worked well together on this important flight program."

Most of Orbiter 101's major structural components have been completed and delivered to Palmdale where they are in final assembly. The wings have been mated to the mid-fuselage, and RI last week shipped the forward fuselage from Downey. Rollout will take place in the fall of 1976.

The flight readiness review (FRR) for Orbiter 101 is now planned for early 1977 prior to the start of approach and landing tests at NASA Flight Research Center, Edwards, Calif. in mid-1977. The first orbital flight, launched from KSC in mid-1979, will land at FRC — as will the first several orbital flight landings.



ORBITER 101 SPROUTS WINGS — The right wing for Space Shuttle Orbiter 101 is moved into position on work stands for mating to the mid-fuselage at Rockwell International Space Division's Palmdale, Calif. assembly plant. The three round openings in the aft fuselage bulkhead are where the Orbiter main engines will be mounted.

ROUNDUP

NASA LYNDON B. JOHNSON SPACE CENTER

HOUSTON, TEXAS



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ASTP Investigators Confer on Findings

Preliminary findings on the results of space processing experiments conducted during the joint U.S.-Soviet Apollo Soyuz Test Project (ASTP) in July were presented by the principal investigators and other involved scientists at conferences October 28 and 29 at the NASA-Marshall Space Flight Center.

The U.S. and West German experiments on electrophoresis — the separation of biological materials such as cells by means of an electrical field — were discussed the first day. Electrophoresis is an important tool in biological and medical research, which may hold the key to development of drugs to fight strokes, heart attacks, clots and blood diseases.

Six of the seven materials processing experiments which were performed using a multipurpose electric furnace were reported the second day. A Russian experiment which also used the furnace was reported upon at the conference. The electric furnace was itself considered as an experiment.

The furnace system provided a means to perform experiments to demonstrate the feasibility of using the weightless space environment to investigate crystal growth, convection, and solidification processes for use in future materials processing applications in space, as well as applications to technology on Earth.

A total of 28 U.S. and joint experiments aboard ASTP were all carried out as programmed during the historic first international manned space mission, with only minor difficulties encountered.

Speakers and their subjects for

the conference on electrophoresis were as follows:

"Electrophoresis Technology Experiment System," by Dr. Robert Allen, PI.

"Fixed Red Blood Cells," by Dr. Allen and Dr. Geoffrey V. F. Seaman, of the University of Oregon Medical School, Portland, Ore.

"Isotachophoresis," by Dr. Milan Bier, of the University of Arizona, Tucson, Ariz.

"Lymphocytes," by Dr. Carol Van Oss, of the State University of New York, Buffalo, N.Y.

"Kidney Cells," by Grant H.

(Continued on page 3)

Ford Names NASA to Host Bicentennial Sci/Tech Expo

NASA has been named by President Gerald Ford as host and sponsor for the Cape Canaveral U.S. Bicentennial Exposition on Science and Technology which will be held at Kennedy Space Center.

"The third century of human progress under free government" is the theme for the exposition in which all government agencies with an interest in science, as well as private industry, have been invited to participate.

Memorial Day 1976 is the target date for the opening and the exposition will run through Labor Day. After the start up period, the exposition is expected to be self sustaining through fees paid by exhibitors as well as nominal admission charges.

Site of the exposition will be adjacent to the Vehicle Assembly Building Complex. KSC already accommodates about 1 million tourists a year. Several million are expected to visit the exposition throughout the year.

"We are interested in science and technology as a spiritual inspiration to the improved quality of life on Earth," commented Dr. James C. Fletcher, NASA Administrator. "We are not interested in science and technology purely as a material force."

"Exploring the heavens ultimately has as its objective, the improvement of man's existence on Earth."

"NASA came into being as an answer to the challenge of space.

We now move forward to the application of what we have learned to the enrichment of life on Earth. In this exposition, it is hoped to give the American public a vision of a wholesome and happy future."

John W. Warner, Administrator of the National Bicentennial Administration, said: "This program, under the sponsorship of a government agency with a proven track record of success — the National Aeronautics and Space Administration — will be the capstone of the many fine programs being sponsored by the departments and agencies of the Federal government."

"As the Bicentennial moves rapidly forward, more and more Americans are clamoring for programs directed towards our country's future potential. Where better to launch the scientific and technological genius of America — the finest in the world — into the third century than here at the site of America's ventures into space."

NASA, Coast Guard Develop Modular Fire-Fighting Rig

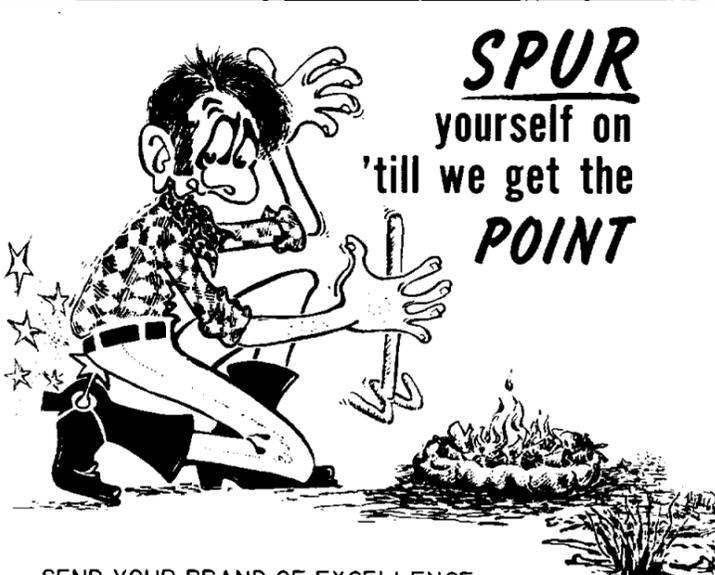
NASA and the US Coast Guard have jointly undertaken design and development of a prototype lightweight portable fire fighting module for fighting shipboard and dock fires.

The self-contained module, capable of pumping sea water at 2,000 gallons per minute, can be lifted by crane or helicopter onto the deck of almost any type of vessel.

Prototype construction at Marshall Space Flight Center is expected to begin early next year.



VISITING PRESIDENT — Egyptian President Muhammad Anwar al-Sadat and son Gamal al-Sadat (nearest camera in Lunar Rover left seat) are briefed on the Rover by JSC Director Christopher C. Kraft, Jr. during Sadat's October 31 visit to the Center. US Vice President Nelson Rockefeller stands behind the Sadats, and Nancy Kissinger, wife of the Secretary of State, stands at left.



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ROUNDUP 

NASA LYNDON B. JOHNSON SPACE CENTER HOUSTON, TEXAS

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Editor: Terry White Photographer: A. "Pat" Patnesky

Eagle flies again

Star Trek it ain't.

Nonetheless, the British-made sci-fi series *Space: 1999* is carried on the tube by more than 150 stations around the country who unilaterally bought the syndication package after it had been turned down by the three major U.S. networks. (Houston KPRC-TV Chan. 2 Monday 7 pm).

Moon Base Alpha, a lunar habitat populated by some 300 Earth persons, takes the place of the indestructible starship *Enterprise*. Only the moonbase and the Moon itself has been somehow boosted out of Earth orbit into an intergalactic trajectory, and the 24 weekly episodes deal with hazards along the trek—er, track.

One cannot help comparing the new show with its predecessor, around which a cult holding regional conventions has grown. *Space: 1999* suffers most in a comparison of main characters with *Star Trek's* Captain Kirk and the pointy-eared Mr. Spock.

The husband-and-wife team of Barbara Bain and Martin Landau of the early *Mission Impossible* cast are in the lead roles in *Space*, but their acting talents lie fallow in the drought of scripts that sound as though *Batman's* scriptwriter had migrated to England. Captain Kirk, Mr. Spock, Scotty and others on the bridge of the *Enterprise* had human dimension that both the script and the *Trek* director brought out. *Star Trek* is a tough act to follow.

Aside from the rather implausible notion that the Moon could be cast adrift by anything less than a cosmic catastrophe, the technology aspects of *Space: 1999* are well done, including special-effects flight sequences of Moon Base Alpha's version of a Greyhound-bus-sized LM with the generic name of *Eagle*. Laser guns at the moonbase are not too different from the *Enterprise's* fasers, and the central computation facility occasionally overloads and passes the buck back to its human programmers.

The overall technological plausibility of *Space: 1999* is not any farther out than *Star Trek's* transporter which dematerialized and rematerialized folks from one place to another. Who is to say? Tomorrow's conceptual technology becomes yesterday's antiques, and one is likely to contract hoof-in-mouth disease by saying something is hokey when technology is advancing at a geometric rate. — TW

Bullwinkle

I'M TRADING IT ALL IN ON
U.S. SAVINGS BONDS
THEY LET YOU SLEEP
EASIER—



Rockwell Gets HiMAT Aircraft Design Go-ahead

NASA has given approval to Rockwell International Corporation to begin final design and construction of two subscale models of a highly maneuverable aircraft incorporating advanced technologies for potential future manned aircraft.

The two unmanned models will be flown by the NASA flight Research Center, Edwards, Calif., in a joint NASA-USAF program to develop advanced technology for high maneuverability using new technology from various technical disciplines.

The RI design calls for a 6.3-meter (21-foot) long subscale model with a "Coke bottle" fuselage shape. Two large canards are mounted on each end of the 4.5-m (15-ft.) wing. Twin vertical tails are located on booms off the wing trailing edge.

The "HiMAT" vehicle will be powered by a General Electric J85 jet engine, providing a supersonic flight capability. A maneuvering capability of eight "g's" is planned for the unmanned aircraft. Empty, the HiMAT will weigh 1,260 kilograms (2,800 pounds).

The two unmanned vehicles will be flown using the Remotely Piloted Research Vehicle test technique developed by FRC. Remotely piloted research vehicles are air-launched from a larger, carrier aircraft and then, using television, telemetry and radar, the test craft is flown through desired maneuvers by the pilot located in the ground cockpit.

This technique provides a highly cost-effective means of flight testing advanced, high risk technology without associated risks to the test pilots.

An \$11.8 million contract was awarded to RI last summer. The first 60-day phase of the contract was to perform detailed program planning. Approval for final design and construction was dependent upon NASA acceptance of this planning.

Delivery of the two vehicles to FRC is expected in late 1977.

Equal Opportunity is
for everybody!



Nimbus to Track Ice Motion

A space satellite project that could have far-ranging impact on oil recovery operations in arctic regions will get underway soon. Polar Research Laboratory of Santa Barbara, Calif. is fabricating 16 air-droppable data collection platforms which will be dropped on arctic pack ice north of Prudhoe Bay, Alaska for relaying ice movement data to NASA's polar-orbit Nimbus Satellite.



PICKED BOSS OF YEAR — Elaine Stemerick presents the National Secretaries Association Clear Lake Chapter 1975-76 "Boss of the Year" award to her supervisor Tony Riggan of the JSC Program Procurement Division at the NSA's annual award dinner.

Secretary Group Names Riggan 'Boss of Year'

Tony C. Riggan, contracting officer in JSC Program Procurement Division, was selected "Boss of the Year" by the NASA Clear Lake Chapter of the National Secretaries Association (NSA). The announcement took place at the Chapter's Sixth Annual Executive Dinner Meeting held recently at the Holiday Inn, NASA Road 1. The selection had previously been made by a panel of independent judges composed of John Shelton, Plant Manager of ARCO Chemical Co., Jim Hargrove, Exec. Vice Pres., Allied Seabrook Bank, and Jeannine Wheeler, Celanese Corp.

The competitive selection was made strictly on the basis of the following criteria, and without benefit of the nominee's name and identification:

Candidates for "Boss of the Year" are nominated by NSA chapter members. Each secretary submitting a nomination presents information concerning her supervisor's education, participation in civic, church and professional activities, achievements and awards received, and business experience. She also states personal reasons that she feels her particular supervisor merits the title.

Elaine Stemerick, Riggan's secretary, said she felt he would be a great Boss of the Year because "he is always pleasant to work with, and even under constant pressure of additional duties, has a pleasant disposition. His congenial personality promotes a happy atmosphere to work in. His personal interest in employees' welfare and advance-

ment has been very beneficial to others. He advises on selection and accomplishment of study courses and lifts the morale of the section."

"He has encouraged me to be active in the NSA, and to continue my education preparatory to taking the Certified Professional Secretary (CPS) examination. (As a recent Certified Professional Contracts Manager (CPCM) by the National Contract Management Association, Tony is very much an advocate of the CPS program.) He has also attended NSA meetings," she said.

As Boss of the Year, Riggan will continue to promote the objective of NSA which is the elevation of the secretary through continuing educational and professional development.

NSA Chapter Holds Seminar

The National Secretaries Association Clear Lake Chapter tomorrow will hold the sixth annual seminar for secretaries at the JSC Robert R. Gilruth Recreation Center.

The workshop seminar will emphasize subjects of interest to secretaries who are continuing their education and training with goals toward advancement into executive secretary, administrative or management positions. Presented by women in business, the seminar is not limited to secretaries but is open to all women who are interested in self improvement.

Following welcoming remarks at 9:30 am by Clear Lake Chamber of Commerce manager Web Sharp, Workshop No. 1, A Mini-Management Development Program, will be held by Dr. Bette Ann Stead, UofH professor of systems and operations management. The second workshop, Human Skills for Secretaries, will be presented by Dr. Dale Hill, UofH psychology department professor.

Seminar pre-registration fee is \$10, and door registration (starting at 8:30 am Saturday) is \$12. The student registration fee is \$5. Call Georgia Yaw at ext 5195 for additional information.

Betty Cornett Named October Secretary

Betty C. Cornett, formerly secretary to the Apollo Spacecraft Program Office manager Glynn S. Lunney, has been selected JSC Outstanding Secretary for October. Her nomination for the recognition was submitted in June before ASPO was disbanded and redesignated as the Shuttle Payload Integration and Development Office. She has since transferred to the JSC Awards Office.

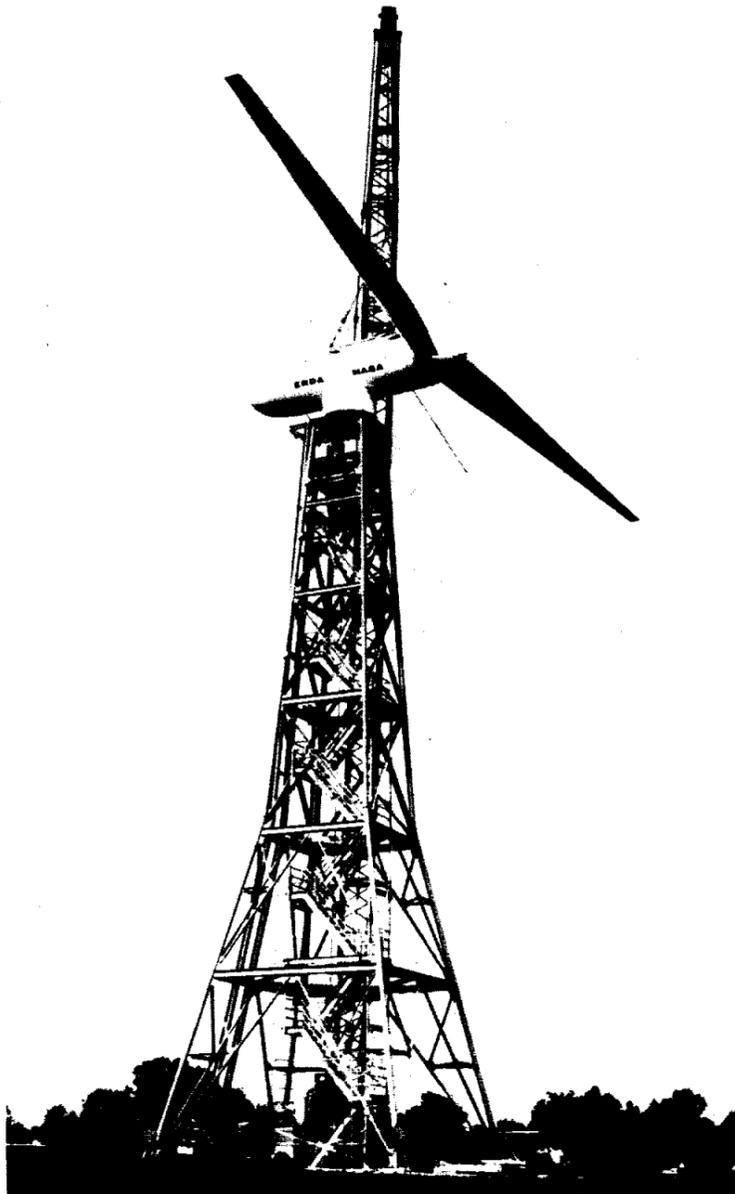
The ASPO recommendation cited Cornett as "a secretary of outstanding skills who has a good sense of priorities and uses excellent judgment in scheduling appointments and responding to ques-



tions directed to the program manager's office.

"When changes were required to the command/service module as a result of Skylab I problems, she coordinated the secretarial support activities, making sound decisions regarding the work priorities while maintaining a calm, poised manner despite the long hours and the pressures involved in documenting critical program decisions.

"She has such a clear understanding of the Apollo-Soyuz Test Project and the people involved," continued the citation, "that she was able to provide excellent guidance, travel arrangements and contacts with the proper JSC people, to the Soviet working groups."



DON QUIXOTE, EAT YOUR HEART OUT! — It would take a tall horse and a long lance to tilt at this windmill at the NASA Lewis Research Center's Plum Brook Station, Sandusky, Ohio. Generating 100 kilowatts of electrical power in a good wind, the wind turbine was dedicated October 29 by NASA and the Energy Research and Development Administration as a first step toward measuring performance and operating and economic characteristics of future wind-powered electrical power generating systems. The Plum Brook wind turbine is the largest in operation, with a tower height of 100 feet and a windmill-blade span of 125 feet.

EAA Attractions

TICKETS AVAILABLE

On sale in Bldg 11 Exchange Store 10 am to 2 pm, no refunds: Astroworld-adults, \$5, children \$4 (regular \$6.50 and \$5.50); ABC Interstate Theaters \$1.50; free Disney Magic Kingdom cards, Six Flags Over Texas Funseekers cards and Lion Country Safari cards.

Dinner theaters: Windmill Dinner Theater *Accommodation*, starring Dennis Cole, \$14/couple (regular \$22) Nov. 9-30, not valid Fri. or Sat.; Dean Goss Dinner Theater has John Bouess comedy *The Loud Red Patrick*, \$16/couple (regular \$22) thru Jan 14, not valid Sat.

Sea Arama: adults \$3.25, children \$2.25 on sale.

CHRISTMAS DINNER DANCE

The JSC Christmas Dinner Dance will be on Saturday, Dec. 6 at the Gilruth Recreation Center starting at 6:30 pm with cocktails. A prime-rib dinner will be served at 8, and two-band dancing will run from 9 until 1 am. Tickets are \$12.50/person and cover cocktails, dinner and dance band of your choice. Table reservations and ticket sales start November 10 from Kathy Spencer, Bldg 4, Rm 123.

RIGGS TENNIS TOURNAMENT RESULTS

Results of the September 20-21 Bobby Riggs Invitational Tennis Tournament are as follows, with first, second and consolation places, respectively in each class:

Advanced: Dan Weber, Gideon Weber and Russell Craig.

Advanced intermediate: Matt Quinn, Mark Brady and John Lotvinville.

Intermediate: Pete Frank, Jeanne Weber and Jerry Craig.

Novice: Dennis Schmidt, John Vincze and Dru Tribble.



TUG-O-WAR COMPETITION

There will be a double elimination tug-o-war tournament at the Gilruth Recreation Center November 18 at 5:30 p.m. There is no fee. Competition is limited to NASA and on-site contract employees. From the results of the tournament, a challenge ladder will be formed with the strongest team at the top and the weakest at the bottom. Form your team now. To register and for further information call x3594 before November 14.

SLIMNASTICS CLUB

Do you have a few bulges you would like to lose? Do you lack energy, feel tired? Would you like to feel great for the coming holidays?

Why not join the ladies Slimnastics Club and get a head start? We meet three times a week: Mon, Tues and Thurs from 5:30-6:30 pm. Come join in one, two or three sessions — whatever fits your life style. Work a little, lunch a little, lose a lot (inches, that is!). Feel great! For more details, call Corinne Poel at 3257, or Doris Kreske or Judy McMullin at 4021.

WOMEN'S EXERCISE CLASS

Attention non-working dependants! Here is your chance to slim up before the holidays. A morning exercise class will start November 11 for 6 weeks at the Gilruth Recreation Center. The class will meet Tuesday and Thursday 9:15 to 10:15. The fee is \$8. To register and further information call x3594. Payment is due November 5th.



BASKETBALL FREE THROW SHOOTING CHAMPIONSHIP

It is time to start practicing for the individual free throw shooting contest to be held at the Gilruth Recreation Center during the weeks of November 10 and 17. The fee is 50 cents and competition is limited to NASA and on-site employees. A trophy will be awarded to the best shooter. A challenge ladder will be formed from the results of the competition. The individual in the number one position on the ladder will keep the trophy until he loses his position. To register and for further information call x3594.

Roundup Swap-Shop

Swap Shop advertising is available to JSC and on-site contractor personnel. Articles or services must be offered as advertised, without regard to race, religion, sex or national origin. Ads should be 20 words or less, including home telephone number. Name and office code must accompany, but need not be included in ad copy. Typed or printed copy must be received (AP3 Attn: Roundup) by Thursday of the week before publication.

BOATS

Fiberglass fishing float with built-in seat, \$16. Klotz, 488-1514.
Info on prices, mkt value and cond of used Lido 14 sailboats for sale by owners. Hoover, 334-2392.

VEHICLES

75 2-dr Mercury Monarch, like new, auto, AC, pwr steer/brks, \$3900. Clouds, 471-2447.
67 Mustang, Holley, duals, accel, Craig FM-8, new paint and xmission, college student needs money, \$800. 337-2695.
Honda SL-125 low miles, good cond, \$275. Doherty, 488-0182.
73 Capri V-6, A-T, sunroof, AM-FM-8trk, \$2700. 782-5938 or 495-1629.
20-in girl's Schwinn green bike, good cond. 333-2964.
69 Chevy 4-dr, air, auto, trir hitch, good tires, \$375. Owens, 554-2969.
71 Honda 350, xcint cond, low miles, \$350. Owens, 554-2969.
72 Toyota Corolla, good cond, new tires. 488-3418 after 5.
74 Cougar XR-7 tan-glamor, 30K miles, \$4400 firm. 771-7386 after 6.
73 Blazer, 2900 miles, carpeted, 4-whl drv, \$4700. 771-7386 after 6.
70 Firebird, air, pwr steer/brks, auto, radio. 334-1440.
72 Chevrolet Vega Kamback wagon, air, radio, economical, good cond, \$1000. 482-1949.
72 Cutlass Supreme, air, pwr, stereo, tape, gold/white, xcint cond, \$2200. Steve, 488-5829.

PETS

Fawn Boxer at stud, Champion Moreleen's Apache Ambush, an Ambush son. Bailey, 337-2855.
Male AKC Irish Setter, 1 1/2 yrs, all shots, needs yard, make offer or free. 472-8825 after 5.

PROPERTY AND RENTALS

Price reduces, terms offered, wooded 3/4 acre slopes down to Dickinson Bayou near Hofbraugarten, exec 4-3-2, many xtras.
Wooded water-view lot at Point Lookout on Lake Livingston, 75x137, utilities, restrictions, pvt campground, \$3295. 946-7587.
4-2 1/2 colonial in El Lago, 2750 sq ft, oak-wooded acre, brick patio, walk dist to school, community pool, tennis, lake, by owner. 334-3001.

HOUSEHOLD ARTICLES

7-ft pool table w/ball return, \$75; 25-in color TV console, new pic tube, \$125. Bliss, 474-4836.
Baby bed mattress, \$9.99. 488-3183.
Portacrib, \$18; bay dressing/strg table, \$15; sterilizer w/bottles, \$5; baby's lamp, \$2.50; diaper pail, \$1.50; hobbyhorse stick, \$2. 334-3001.
Hahn Eclipse self-prop lwnmwr, comp ovrhld, big-wheeled, \$60; fert sprdr, \$8. 334-3001.
Wards automatic dishwasher, 10 cycle, convrtbl, coppertone, like new, \$200. Smith, 482-0935.

MISCELLANEOUS

Car stereo cassette tape player; also home stereo cassette player/recdr. Riojas, 945-3094 after 4.
Ham gear: Heath SB-220 linear, \$325; Drake TR4C, xtrnl VFO, pwr sup, \$600; Heath Hw-101 xcvr, CW filter, pwr sup, \$325. Linsey, 488-0517.
Outside Christmas display Santa/sleigh & seven reindeer, lighted, w/stands, \$90. 941-6398.
Auto trunk lid luggage rack, new, chrome pltd, 21x44-in, \$40; 68 Plym svc manual, \$5. Marchal, 534-3021.
Dual steel gas tanks for 63-72 GMC/Chev pickup, \$110. 481-3787.
Two 10x16.5 tires w/whls for Chev/GMC 1/2-ton pickup, 6-lugs, \$90. 481-3787.
Ruger Super Blackhawk .44 magnum, Herret grips, 300 rds brass, 150 rds ammo, perfect, \$200. 488-3966.
Heavy-duty chainsaw, \$30. Ward, 488-5445.
Used Sears Exercycle, mint cond, \$50. Poindexter, 474-2203.
74 Skyhawk II, less than 500 hrs TT, full IFR, \$23/hr wet. Hartsoe, 471-4410.
Barrel for Remington 1100, like new, used once, full choke 30-inch, \$39. 544-2377.
1/2-hp 115-v 3450 rpm motor, \$35; 8-trk tape deck, walnut, \$30; G78x14 belted WSW Firestone, good rubber, \$10/ea; Argus 8mm proj, \$30. 333-2395.

WANTED

Used 17-19 ft fiberglass canoe, good cond. 534-2437.

ASTP Findings (Continued from page 1)

Barlow, of Abbott Laboratories, Chicago, Ill.

"German Electrophoresis," by Dr. Kurt Hannig, PI, of the Max Planck Institute, Munich, Germany.

"General Discussion and Sum-

mary," by Dr. Robert Snyder, of MSFC.

The agenda for the conference on ASTP Materials Processing Experiments follows:

"Multipurpose Electric Furnace," by Arthur Boese, PI.

"Surface Tension Induced Convection," by Harold L. Adair, of Oakridge National Laboratories, Oak Ridge, Tenn., representing Dr. Richard Reed, PI, also of Oak Ridge.

"Monotectic and Synthetic Alloys," by Dr. Choh-Yi Ang, PI, Hawthorne, Calif., consultant to MSFC. (Dr. Lacy is co-investigator for this experiment.)

"Interface Markings in Crystals," by Dr. Harry C. Gatos, PI, of Massachusetts Institute of Technology, Cambridge, Mass.

"Zero-G Processing of Magnets," by Dr. David J. Larson, PI, of Grumman Corp., Bethpage, N.Y.

"Crystal Growth from the Vapor Phase," by Dr. Herbert Wiedemeier, of Rensselaer Polytechnic Institute, Troy, N.Y.

"Halide Eutectics," by Dr. Carour Yeh, of the University of California at Los Angeles, representing Dr. Alfred S. Yue, PI, also of UCLA.

"Crystal Growth," by Dr. M. David Lind, of Rockwell International, Downey, Calif. (Dr. Lind is PI for one of the ASTP experiments managed by the NASA-Johnson Space Center, Houston.)



COST REDUCERS — JSC Third Quarter Cost Reduction Awards were presented to 18 JSC employees in an October 20 ceremony by JSC Director Christopher C. Kraft, Jr., who commented to the group, "Almost every day at the Center, we seem to be dealing with more money problems than we are technical problems, and we need people to feel challenged by that element of our business as challenged by the Space Shuttle or whatever else is in front of us in a technical sense." Award recipients were, top row, left to right: Milton F. Baker, Norman Belasco, Maurice C. Brooks, Jack Q. Dunaway and Jack Fuller. Second row: James A. Lawrence, William S. Lee, Richard J. Piotrowski representing several recipients in the Engineering and Operations Branch, Carl A. Romero and James W. Van Artsdalen. Third row: Gene Waldron, Clyde O. Waters, Glenn W. Watkins, Samuel R. Weathersby and Lyle T. White. Not present at the ceremony: T. R. Loe and Edward F. McElwee.

NASA-ERDA Negotiate With 16 Firms For Low-Cost Solar Cell Contracts

Selection of 16 organizations to negotiate contracts for development of low-cost solar cells for residential and commercial use was announced October 21 by NASA, the Energy Research and Development Administration (ERDA) and the NASA Jet Propulsion Laboratory (JPL), Pasadena, Calif.

Twenty-two contracts, which could total approximately \$12 million, will be awarded to the selected organizations as part of the Low Cost Silicon Array Project sponsored by ERDA and conducted by JPL.

The project is designed to foster an industrial capability by 1985 to produce silicon solar cells or arrays at a market price of less than \$500 per kilowatt capacity. The current price is about \$20,000 to \$25,000 per kw capacity.

Today's market for solar cells is estimated to be about 100 kw annually. The projected 1985 market is 500,000 kw annually.

Negotiations by JPL are for: (1) the production of low-cost solar grade silicon; (2) the economical production of silicon in large area sheets suitable for use in solar cells; (3) the development of economical encapsulation materials and techniques for array lifetimes greater than 20 years; and, (4) the development of automated processes and facilities for the low-cost production of arrays. Production contracts for procurement of array modules will be negotiated in the near future.

The bulk of these modules will be used to initiate a series of ERDA-funded tests of photovoltaic systems in cooperation with the Department of Defense to establish the technical feasibility of the use of photovoltaics in military applications.

The remainder of these modules will be used to initiate a similar effort oriented to the civil sector and managed for ERDA by the NASA Lewis Research Center in Cleveland, Ohio.

Solar cells convert sunlight directly to electricity, are pollution free and require no moving parts. The electric power is generated without the use of limited fuel resources.

Solar cells have been used to power unmanned and manned spacecraft for more than 15 years. Some low power, remotely located terrestrial applications have been demonstrated for more than 10 years. However, their use in large, economically competitive applications has not been developed. The principles of operation and the technology of silicon photovoltaic energy conversion is well understood and known to be reliable. The materials required are abundant and safe.

Fifty-two organizations submitted 75 bids for this work. The organizations selected for contracts are:

Solar Grade Silicon Material: Battelle, Columbus Laboratories; Columbus, Ohio; Dow Corning Corp., Research Division; Hemlock, Mich.; Monsanto Research Corp., St. Louis, Mo.; Motorola, Inc.; Phoenix, Ariz.; Texas Instruments, Inc.; Dallas, Tex.; Union Carbide Corp.; Sistersville, W. Va.; and Westinghouse, Research Laboratories; Pittsburgh, Pa.

Large Area Silicon Sheet: Crystal Systems, Inc.; Salem, Mass.; General Electric, Research & Development Center; Schenectady, N.Y.; Honeywell Corp., Research Center; Bloomington, Minn.; Mobil-Tyco Solar Energy Corp.; Waltham, Mass.; Motorola Inc.; Phoenix, Ariz.; RCA Laboratories; Princeton, N.J.; Rockwell International, Electric Research Division; Anaheim, Calif.; University of South Carolina; Columbia, S.C.; and Varian Vacuum Division; Lexington, Mass.

Array Encapsulation Materials and Techniques: Battelle, Columbus Laboratories; Columbus, Ohio; Rockwell International, Automatics Group; Anaheim,

Calif.; Solar Power Corp.; Wakefield, Mass.

Automated Assembly of Arrays: Motorola, Inc.; Phoenix, Ariz.; RCA Laboratories; Princeton, N.J.; and Texas Instruments, Inc.; Dallas, Tex.

ERDA's national photovoltaic conversion program also sponsors work in the following other areas: systems engineering and analysis; test and applications; research and development on materials and devices other than single crystal silicon; concentrator systems; and storage and power conditioning.

US, Soviet Scientists Discuss Remote Sensing

Eight Soviet scientists met with US experts on the remote sensing of geology and agriculture in late October in Sioux Falls, SD. The discussions were part of the joint effort by NASA and the Soviet Academy of Sciences to advance studies of the Earth from space.

NASA and US Geological Survey representatives and part of the Soviet team reviewed the results of the two nations' previous remote sensing projects in geology and considered possible future work in this area. The Soviet geologists also attended the first William T. Pecora Symposium on the applications of remote sensing to mineral and mineral fuel exploration in Sioux Falls.

Other Soviet scientists visited an agricultural area used as a test site for interpreting and evaluating data gathered by aircraft and NASA satellites. In 1974, American scientists visited a comparable Soviet test site near Kursk in the Ukraine. Discussions with NASA and U.S. Department of Agriculture scientists also were held.

The Soviet delegation included five geologists and engineers: Vladimir B. Komarov, Vladimir I. Makarov, Vladimir V. Oreshin, Sergey I. Strel'nikov and Vladimir G. Trifinov; three researchers from the Geography Institute of the USSR: Dmitriy G. Tsvetkov and Professor Sergey V. Zonn; and translator Yuriy V. Zonov.

This cooperative effort by NASA and the Soviet Academy is one of several undertaken following an agreement reached in 1971 and formally endorsed at the May 1972 Moscow summit meeting. In early 1973, NASA and the Soviet Acad-

emy conducted an intensive study of the Bering Sea using satellites, aircraft and research ships to evaluate the usefulness of remote sensing for studies of sea ice conditions.

Equal Opportunity is good business!

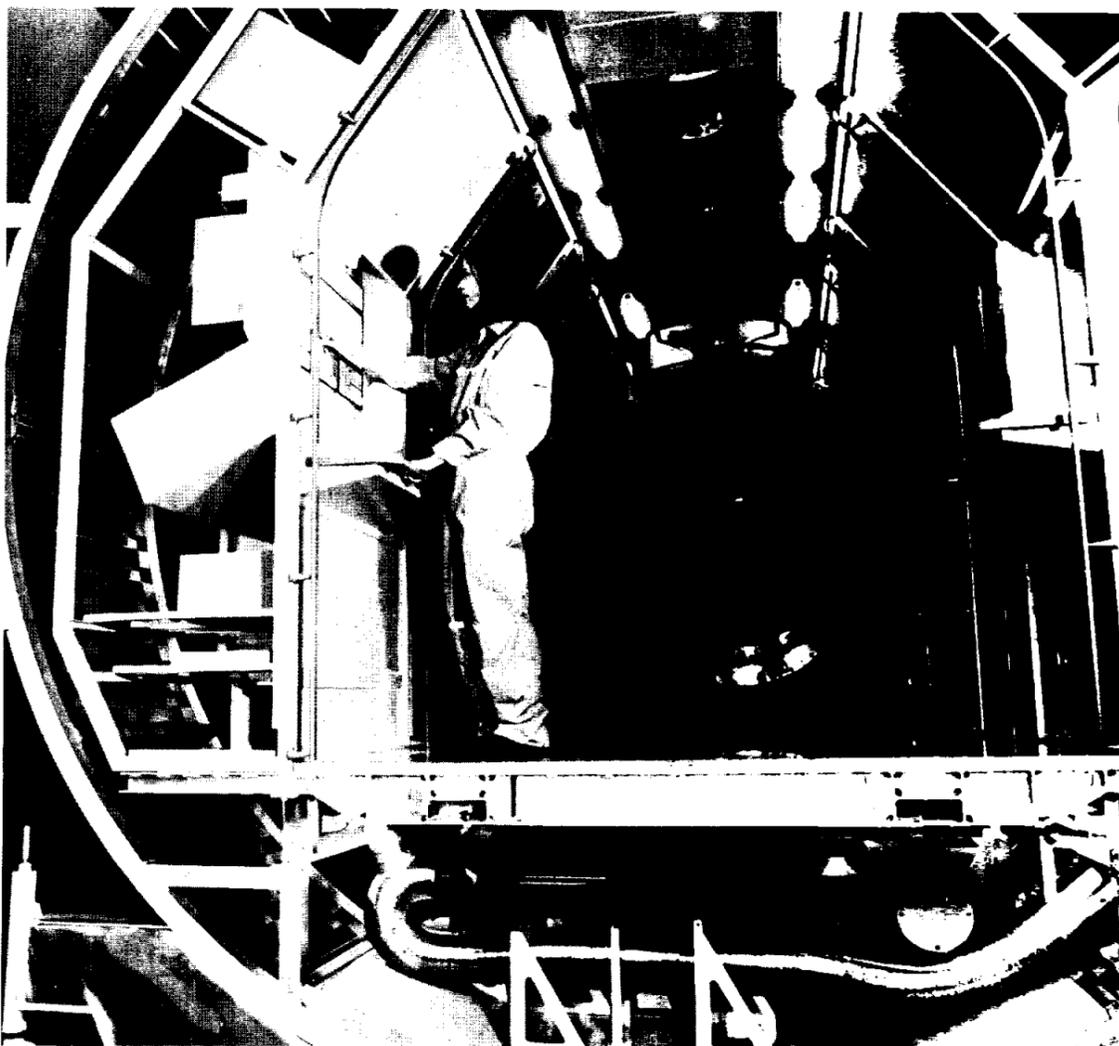


Astronomers Find Carbon Monoxide Around Jupiter

Astronomers in a joint NASA Jet Propulsion Laboratory-University of Texas team recently detected trace quantities of carbon monoxide in Jupiter's atmosphere.

The team gathered high-resolution spectra using instruments in conjunction with UofT's McDonald Observatory on Mt. Livermore in West Texas. Carbon Monoxide molecules were detected to a depth of 50 kilometers into the planet's lower atmosphere.

Hydrogen and helium comprise the major elements in Jupiter's atmosphere, with minor known traces of methane, ammonia, ethane, acetylene, phosphine and water vapor.



SHIRTSLEEVE WORKSHOP — A technician at the ERNO/VFW-Fokker plant in Bremen, Federal Republic of Germany, checks a console layout in the Spacelab full-scale soft mockup of the pressurized module in which payload specialists will work in a shirtsleeve environment. Now planned for first flight in 1980 as a Space Shuttle payload, Spacelab is being built by ERNO under a contract with the European Space Agency. (ERNO photo)